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This layman-friendly paper by UK radiation expert Dr. Andrew Goldsworthy describes why and how wireless microwave technologies

DE-CONSTRUCT

the human body

Excerpted from: ***Some Facts About Cell Phone Radiation***

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Modulated Radio Waves Are Not Safe

Bawin et al. also showed that the situation changes drastically when the signal is "amplitude modulated" so that its strength rises and falls in time with a lower frequency. In particular, they found that signals that were too weak to generate significant heat, could now drive structurally important calcium from the surfaces of brain cells....The loss of this calcium weakens membranes and makes them more likely to leak and give unwanted biological effects.

Cell Phone Signals Have to be Modulated

Cell phone signals have to be modulated if they are to carry information such as speech and various control signals needed to make the system work. Most digital modulation systems have sharp changes in signal strength. These occur over a wide range of frequencies, some of which are biologically active. Further, they occur at radiation levels many order of magnitude lower than those specified by international exposure guidelines. These guidelines are therefore set far too high to protect from modulated radiation.

How the Radiation Affects Us

The body can collect the signal and turn it into electric currents just like the antenna of a radio set or a cell phone. These currents are carried by ions (electrically charged atoms or molecules) flowing through the living tissues and in the blood vessels (a system of tubes full of an electrically-conducting salty fluid that connect almost every part of the body). When these currents impinge on cell membranes, which are normally electrically charged, they try to vibrate in time with the current. Pure unmodulated radio frequency signals change direction far too quickly to cause serious vibration. Almost as soon as the membrane starts to move in one direction, it is driven back in the other so it remains more or less stationary.

However, living cell membranes are able to demodulate these modulated signals and extract the more dangerous lower frequencies, which can now cause significant vibration on a molecular scale. In particular, they drive the negatively charged molecules of the membrane and the positively charged ions, which are attached to it, in opposite directions. As a result, some of these ions are shaken loose. Those with a double charge, such as calcium ions are lost preferentially and replaced by others with only one charge, which are less affected. But ions with one charge are less able to stabilize the membrane, which therefore becomes weaker and more inclined to leak. This in turn can produce all sorts of unwanted biological effects, ranging from electromagnetic hypersensitivity (EHS) to a loss of fertility and an increased risk of getting cancer.

How cells demodulate the signal

The mechanism of demodulation is controversial, but there is no doubt that it occurs. The best explanation is that the multitude of minute ion channels found in cell membranes act as electrically-biased point contact diodes (the inside of a cell is normally several tens of millivolts negative to the outside). These can rectify and demodulate the signal, even at microwave frequencies, so that the low frequency component appears across the membrane, where it can do the most damage.

How people become electrosensitive (EHS)

A cell phone signal, when demodulated in this way, generates a whole family of low frequency components, some of which are biologically-active and cause membrane leakage. One consequence of this leakage is to make the sensory cells of electrosensitive individuals give a whole range of false sensations.

We all have countless sensory cells that sense touch, heat, pressure, pain etc., but they nearly all work on the same principle. When they sense whatever they are programmed to sense, their membranes deliberately "leak" ions, which short-circuit the natural electrical potentials across them, and this triggers them to send the relevant nerve impulses to the brain.

Unfortunately, people suffering from EHS have significantly higher natural rates of membrane leakage as measured by their skin conductance (Eltiti et al. 2007). Since their leakage rates are already high, even small amounts of electromagnetic radiation that would not affect non-sensitive individuals can trigger their symptoms. Not everyone gets exactly the same symptoms, but they include false feelings of heat, touch, pressure, crawling sensations, pins and needles and pain.

The radiation can also affect the “hair cells" of the inner ear, which work in much the same way. Leakage here can trigger false sensations of sound (tinnitus). There is a similar effect on the hair cells of the part of the inner ear that controls balance. Leakage here gives feelings of dizziness and symptoms of motion sickness, including nausea.

EHS may become a major problem for us all. Although only a few percent of the population are at present electrosensitive, the condition can be brought on in hitherto healthy people by repeated or prolonged exposure to the radiation. However, it sometimes takes many years to develop so, even if you are currently one of the lucky ones who are not affected, there is no guarantee that it will stay that way.

Effects on the brain

When the neurons of the brain leak, they become more likely to transmit nerve impulses, some of which are spurious and have no right to be there. This explains many of the symptoms reported by people living near cell towers. They include brain hyperactivity, mental fogginess, loss of concentration, sleep disturbances, stress headaches, migraine and possibly an increased risk of people with epilepsy getting seizures.

Another effect on the brain is the disruption of the blood-brain barrier. This is a layer of tissue between the blood system and the brain, where the gaps between the cells are sealed, so that no unwanted materials can enter the brain. Electromagnetic exposure makes this layer leak potentially toxic substances that can cause permanent brain damage. The effects of this may not be immediately apparent because the brain has spare capacity, but are likely to be progressive and lead to early dementia.

Effects on the heart

People exposed to the radiation from cell towers sometimes report cardiac arrhythmia and palpitations. These too can be explained by membrane leakage. The cells of the heart muscle have also been shown to lose membrane calcium following electromagnetic exposure and may also leak. Normally, the rhythm of the heart is controlled electrically by waves of programmed ion leakage that spread through the heart causing it to contract. Unscheduled ion leakage brought about by electromagnetic radiation can disrupt this process and induce cardiac arrhythmia, with a consequent increased risk of getting heart attacks.

Effects on the skin

Leakage in the cells of the skin can cause inflammation as their contents leak out. There is also a barrier layer in the skin (the stratum granulosum) in which the gaps between the cells are sealed, as in the blood brain barrier. When this leaks, it allows toxins and allergens to enter the body more easily. This can explain the current increase in multiple chemical sensitivities and allergies, which appear to coincide with our ever-increasing exposure to non-ionizing electromagnetic radiation.

Can we act responsibly?

Almost no one wants to give up the convenience of having a cell phone. But at present, the toxic effects of their radiation are unacceptably high. Much of this seems to be due to the way in which the microwaves

are modulated to carry information. A great deal could be done to improve the modulation process; e.g. to remove the low frequency changes in signal strength that appear to be particularly damaging. This work will need to be done by engineers working in concert with biologists, but it may be some time before we have an inherently safe system. In the meantime, we need to do everything we can to reduce our exposure levels. No one wants a "nanny state" but it is the duty of Governments to warn us of the health risks of using cell phones so that we can use them responsibly.

The cell phone operators have responsibilities too

The radiation from cell towers is potentially more dangerous than cell phones themselves because they run continuously day and night and have been shown to have many unpleasant effects on people living near them. These appear to be due to an attenuation of their normal circadian rhythms, leading to tiredness during the day, poor sleep at night and a weaker immune system. The immune system is linked closely to these rhythms, and any reduction in their efficacy will increase the risk of general ill health. Furthermore, the immune system also gets rid of incipient cancer cells so, if compromised by radiation, it will increase the risk of getting cancer, something that is already being reported in people living near cell towers.

It is now up to the cell phone operators. At present, the law allows them to put cell towers pretty much wherever they like. But this law was made many years ago before many of the non-thermal biological effects of electromagnetic radiation were discovered; let alone understood. The fact that many of these effects now have plausible scientific explanations strengthens the need for more rigorous legislation with tighter limits on base station power and restrictions on placing them in densely populated areas, especially in sensitive locations such as schools. The question is, are cell phone companies yet fully aware of the dangers they pose and do they have sufficient social conscience to do this on a voluntary basis?

So:

Dr. Goldsworthy has provided us with a mini bachelor's degree in microwave radiation risk and damage. Now, for a mini master's degree, listen to leading US epidemiologist and professor Dr. Devra Davis speaking at an Australian law school in late 2015. As a renowned scientist, Dr. Davis draws on her vast work in environmental studies and toxicology with the U.S. National Research Council to explain the latest science on how wireless technologies do their damage. She reveals amazing facts about the deadly Wi-devices in the hands, against the brains and even in the mouths of America's very young children. Gifted Australian neurosurgeon, Dr. Charles Teo, adds important information on cell phone brain cancer. Parents and grandparents owe it to their children to take this information seriously.

More Food for Thought

Anyone who doubts that wireless microwave radiation can impose *mechanical action* on molecules, cell membranes, mitochondria and DNA of the human body should take a two-minute look at how a transmitting cell phone manipulates magnetic ore in the YouTube below. As you watch this carcinogenic radiation in action, remember that the human brain contains magnetosomes, which are iron oxides that behave like magnets. When active mobile phones are held against the head, might brain magnetosomes be manipulated like the ore in the video?

Millions of people hold transmitting wireless devices in their hands for hours each day. Some report feeling a creepy vibration and even heat. Watching this video makes thoughtful people wonder how such forceful radiation, flowing through the skin, *mechanically affects* the blood, the bones and the connective tissues within the hands and arms.

Uninformed pregnant women across the US routinely play with transceiving wireless smart phones, computers and tablets only millimeters away from their bellies. Amniotic fluid *amplifies* wireless radiation flowing as electromagnetic currents through the body of a pregnant Wi-addict. Is the writhing ore seen in this video a surrogate for the typical American fetus of the Microwave Age? As you watch this imagery, weigh it against the potential for microwave-induced brain damage in the fetus, as explained by Dr. Davis in the video above.